

2N5659

10 AMP

HIGH SPEED NPN TRANSISTOR

120 VOLTS

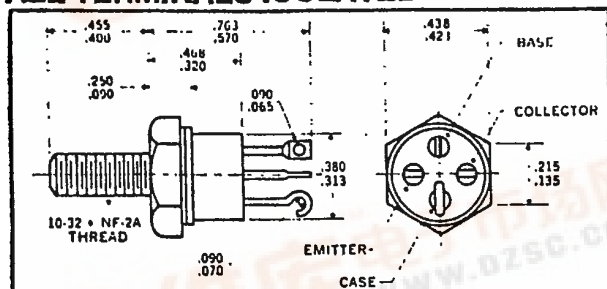


14830 Valley View Avenue
La Mirada, California 90638
(213) 921-9660
TWX 910-583-4807
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CASE STYLE Z

JEDEC TO-111

ALL TERMINALS ISOLATED FROM CASE



FEATURES

- RADIATION TOLERANT
- FAST SWITCHING, 150 NSEC MAX t_{on}
- HIGH FREQUENCY, TYPICAL f_T 100 MHZ
- BVCEO 80 VOLTS MIN
- HIGH LINEAR GAIN, LOW SATURATION VOLTAGE
- 200°C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH 2N6188 AND 2N6189

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CEO}	80	Volts
Collector - Base Voltage	V_{CBO}	120	Volts
Emitter - Base Voltage	V_{EBO}	7	Volts
Collector Current	I_C	10	Amps
Base Current	I_B	2	Amps
Total Device Dissipation @ $T_C = 100^\circ C$	P_D	30	Watts
Derate above 100 °C		300	mW/°C
Operating and Storage Temperature	T_j, T_{stg}	-65 to +200	°C

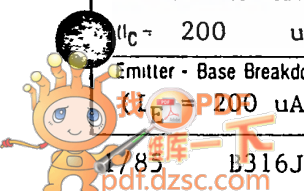
THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.33	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 100$ mA Adc)	BV_{CEO}	80		Vdc
($I_C = 100$ mA Adc, $R_{BE} = 10$ ohms)	BV_{CER}	120		Vdc
Collector - Base Breakdown Voltage ($I_C = 200$ uAdc)	BV_{CBO}	120		Vdc
Emitter - Base Breakdown Voltage ($I_E = P200$ uAdc)	BV_{EBO}	7		Vdc

NOTE: All specifications subject to change without notice.

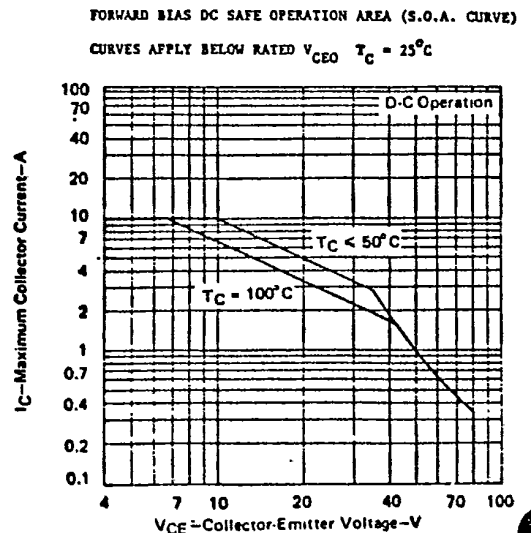
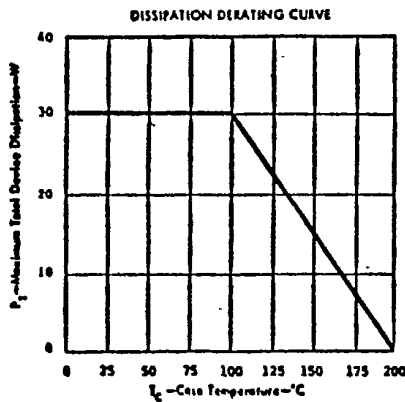


ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 120$ Vdc)	I_{CES}		200	nA dc
Collector Cutoff Current ($V_{CE} = 80$ Vdc, $T_C = 150^\circ\text{C}$)	I_{CES}		100	$\mu\text{A dc}$
Emitter Cutoff Current ($V_{EB} = 7$ Vdc)	I_{EBO}		10	$\mu\text{A dc}$
DC Current Gain* ($I_C = 500$ mA dc, $V_{CE} = 2$ Vdc) ($I_C = 5$ A dc, $V_{CE} = 5$ Vdc) ($I_C = 10$ A dc, $V_{CE} = 5$ Vdc)	h_{FE}	40 50 30	250 150	
Collector - Emitter Saturation Voltage* ($I_C = 5$ A dc, $I_B = 500$ mA dc) ($I_C = 10$ A dc, $I_B = 1$ A dc)	$V_{CE(SAT)}$		0.5 1.0	V dc
Base - Emitter Saturation Voltage* ($I_C = 5$ A dc, $I_B = 500$ mA dc) ($I_C = 10$ A dc, $I_B = 1$ A dc)	$V_{BE(SAT)}$		1.3 1.8	V dc
Current - Gain - Bandwidth Product ($I_C = 500$ mA dc, $V_{CE} = 5$ Vdc, $f = 10$ MHz)	f_T	30		M Hz
Output Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1$ MHz)	C_{ob}		150	pf
Delay Time Rise Time Storage Time Fall Time	t_d t_r t_s t_f		150 800	ns
($V_{CC} = 25$ Vdc, $I_C = 5$ A dc, (t_{on}) $I_{B1} = I_{B2} = 250$ mA dc, Base - Emitter clamp diode = 1N5802 or equivalent) (t_{off})				

*Pulse Test: Pulse width = 300 μs , Duty Cycle = 2%

TYPICAL OPERATING CURVES

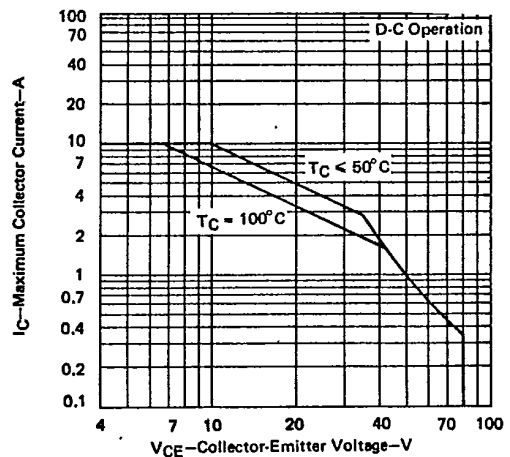
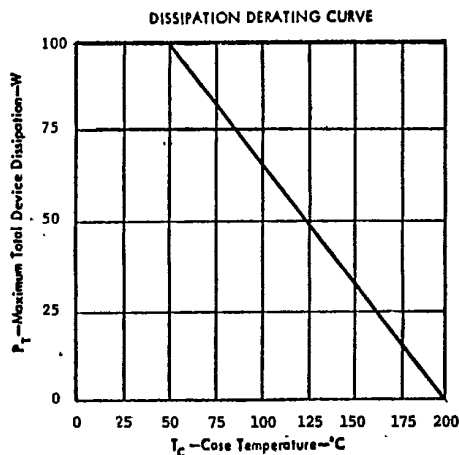


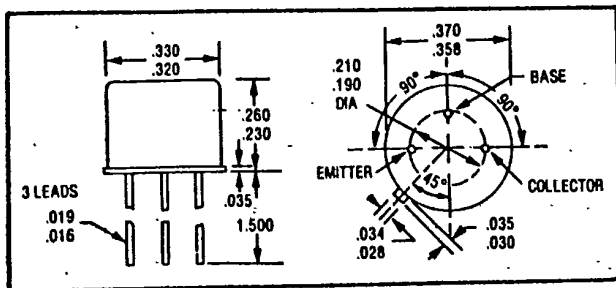
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current (VCE = 40 Vdc) (VCE = 60 Vdc)	ICEO ICES		50 1.0	uAdc uAdc
Collector Cutoff Current (VCE = 100Vdc) (VCE = 60 Vdc, VBE = 2 Vdc, TC = 150°C)	ICEX ICEX		1.0 500	mAdc uAdc
Emitter Cutoff Current (VEB = 4 Vdc) (VEB = 5.5 Vdc)	IEBO		1.0 1.0	uAdc mAdc
DC Current Gain* (IC = 100 mAdc, VCE = 5 Vdc) (IC = 5 Adc, VCE = 5 Vdc) (IC = 10 Adc, VCE = 5 Vdc)	hFE*	20 50 30 70 20 45	90 200	
Collector - Emitter Saturation Voltage* (IC = 5 Adc, IB = 500 mAdc) (IC = 10 Adc, IB = 500 mAdc)	VCE (SAT)*		0.9 1.5	Vdc
Base - Emitter Saturation Voltage* (IC = 5 Adc, IB = 500 mAdc) (IC = 10 Adc, IB = 1 Adc)	VBE (SAT)*		1.8 2.2	Vdc
Current - Gain - Bandwith Product (IC = 500 mAdc, VCE = 5 Vdc, f = 20 MHz)	fT	35 40		MHz
Output Capacitance (VCB = 10 Vdc, IE = 0, f = 1 MHz)	Cob		275	pf
Base - Emitter Voltage* (VCE = 5 Vdc, IC = 5 Adc)	VBE (ON)*		1.8	Vdc
Delay Time (VCC = 40 Vdc)	td		100	ns
Rise Time VEB(off) = 3.0 Vdc,	tr		100	ns
Storage Time IC = 2 Adc,	ts		2.0	us
Fall Time IB1 = IB2 = 200 mAdc)	tf		200	ns

*Pulse Test: Pulse width = 300 us, DutyCycle = 2%

TYPICAL OPERATING CURVES

FORWARD BIAS DC SAFE OPERATION AREA (S.O.A. CURVE)
CURVES APPLY BELOW RATED VCE0 TC = 25°C



SFT6200**10 AMP****RADIATION TOLLERANT NPN TRANSISTOR****150 VOLTS****SSDI**14830 Valley View Avenue
La Mirada, California 90638
(213) 921-9660
TWX 910-583-4807
FAX 213-921-2396**CASE STYLE W
JEDEC TO-5****FEATURES**

- MIN hFE OF 10 AT 1A, 10V. AFTER 1×10^{14} FAST NEUTRONS/CM²
- HIGH FREQUENCY, 150MHz TYPICAL
- ULTRA FAST, 150ns TYPICAL t_{on}
- BVCEO 80 VOLTS MIN
- HIGH LINEAR GAIN, VERY LOW SATURATION
- 200°C OPERATING TEMPERATURE
- GOLD EUTECTIC DIE ATTACH

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage $R_{BE} = 1K$ Ohms	V_{CEO} V_{CER}	80 150	Volts
Collector - Base Voltage	V_{CBO}	150	Volts
Emitter - Base Voltage	V_{EBO}	6	Volts
Collector Current	I_C	10	Amps
Base Current	I_B	2	Amps
Total Device Dissipation @ $T_C = 25^\circ C$	P_D	10	Watts
Derate above 25 °C		66.6	mW/°C
Operating and Storage Temperature	T_j, T_{stg}	-65 to 200	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	15	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 10mAdc$) ($I_C = 20uAdc, R_{BE} = 1Kohm$)	BV_{CEO} BV_{CER}	80 150		Vdc
Collector - Base Breakdown Voltage ($I_C = 20uAdc$)	BV_{CBO}	150		Vdc
Emitter - Base Breakdown Voltage ($I_E = 20uAdc$)	BV_{EBO}	6		Vdc

NOTE: All specifications subject to change without notice.

ELECTRICAL CHARACTERISTICS

Characteristics		Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 40 \text{ Vdc}$)		I_{CEO}		10	μA
Collector Cutoff Current ($V_{CB} = 100 \text{ Vdc}$)		I_{CBO}		10	μA
Emitter Cutoff Current ($V_{EB} = 4 \text{ Vdc}$)		I_{EBO}		1.0	μA
DC Current Gain* ($I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 1.0 \text{ A}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 5.0 \text{ A}$, $V_{CE} = 5 \text{ Vdc}$)		h_{FE}	50 50 50	200	
Collector - Emitter Saturation Voltage* ($I_C = 5.0 \text{ A}$, $I_B = 500 \text{ mA}$)		$V_{CE(SAT)}$		0.5	Vdc
Base - Emitter Saturation Voltage* ($I_C = 5.0 \text{ A}$, $I_B = 500 \text{ mA}$)		$V_{BE(SAT)}$		1.2	Vdc
Current - Gain - Bandwidth Product ($I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1 \text{ MHz}$)		f_T	100		MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $f = 1 \text{ MHz}$)		C_{ob}		200	pf
Post Irradiation DC Current Gain* ($I_C = 1 \text{ A}$, $V_{CE} = 10 \text{ Vdc}$, $1 \times 10^{14} \text{ n/cm}^2$) (Fast Neutrons (n) at E = 10KeV Reactor Spectrum)		h_{FE}	10		
On Time	($V_{CC} = 30 \text{ Vdc}$, $I_C = 5.0 \text{ A}$)	t_{on}		200	ns
Off Time	($I_{B1} = I_{B2} = 500 \text{ mA}$)	t_{off}		800	ns

*Pulse Test: Pulse width = 300 us, DutyCycle = 2%

